UNITED STATES DISTRICT COURT

NORTHERN DISTRICT OF CALIFORNIA

SAN FRANCISCO DIVISION

NETWORK APPLIANCE, INC.,

Plaintiff-Counterclaim Defendant,

v.

SUN MICROSYSTEMS, INC.,

Defendant-Counterclaim Plaintiff.

CASE NO. C-07-06053-EDL

DECLARATION OF GREGORY ENNIS IN SUPPORT OF SUN MICROSYSTEMS, INC.'S RESPONSIVE CLAIM CONSTRUCTION BRIEF

I, Gregory Ennis, declare as follows:

I. INTRODUCTION

1. I have been retained by Sun Microsystems as an expert witness with regard to certain patents being asserted in Case No. 6053, including U.S. Patent No. 6,873,630 (the "'630 patent").

2. I am over the age of eighteen and I am a citizen of the United States.

3. Attached hereto as Exhibit A is a true and correct copy of my current *curriculum vitae* ("CV").

4. I received a Masters degree in Computer Engineering from Stanford University in 1979. Prior to that I received a Masters degree in Mathematics from the University of Wisconsin (with a Computer Science minor) in 1976, and a BA (with great distinction) in Mathematics from the University of California, Berkeley in 1974.

5. I am presently an independent consultant doing business as Ennis Associates at 1092 Nowita Place, Venice, CA 90291.

6. I have over 25 years experience as a development engineer and engineering manager in the communications industry. Since 1989 I have been an independent engineering consultant, providing system architecture and product engineering services to a variety of companies in the telecommunications and computer industries, including the Wi-Fi Alliance, 3Com, Hughes, Symbol Technologies, Xircom, and First Pacific Networks.

7. Prior to starting my consulting business I was Vice President of Engineering for Univation, Inc., where I directed the development of Ethernet adapter cards, file servers, and related products and managed a group of hardware and software engineers.

8. Prior to that I was Director of Engineering at Sytek, Inc., where my responsibilities included directing the development of LAN, network gateway, and related products, and managing a group of hardware and software engineers.

9. I have served as chairman of the Broadband subcommittee of the IEEE 802.3 Ethernet standards committee, and as editor of the IEEE 802.11 Wireless LAN committee.

10. I am currently the Technical Director of the Wi-Fi Alliance. My responsibilities include directing the development of programs for wireless interoperability certifications.

11. I am a named inventor on three U.S. patents, listed in my CV.

12. Over the last four years I have testified at deposition, at trial, or at both in the following cases:

- Starent v. UT Starcom (deposition)
- Absolute Software v. Stealth Systems Inc. (deposition)
- QRSpex v. Frog Design (deposition)
- HP v. Intergraph (deposition)
- Dell v. Lucent (deposition and trial)
- InnerWireless v. Johnson Controls (deposition)
- Network-1 v. D-Link (deposition)

13. My compensation for consulting on this matter is $250 per hour. My

compensation does not depend on the outcome of this dispute.

II. MATERIALS REVIEWED

14. I reviewed the following materials in my preparation of this declaration:

a. U.S. Patent No. 6,873,630 and its file history;

b. Declaration of Professor Anthony Acampora Regarding Claim Construction for U.S. Patent No. 6,873,630;

c. Plaintiff NetApp, Inc.'s Opening Claim Construction Brief;

d. IEEE 802.3-2005; and

e. The parties' agreed constructions for U.S. Patent No. 6,873,630.

III. BACKGROUND OF THE '630 PATENT

15. U.S. Patent No. 6,873,630 is entitled "Method and Apparatus for a Multi-Gigabit Ethernet Architecture." This invention provides for communication between devices at multi-gigabit speeds by combining multiple lower-speed channels into a single higher-speed communication link. The basic technology involves Ethernet networks, which are networks based on standards developed by the IEEE 802.3 Working Group. The '630 patent provides for a higher speed Ethernet network than was possible at the time of the invention, and it was subsequently incorporated into a revision of the IEEE 802.3 standard.

16. The utility of the invention of the '630 patent arises out of the need for networks that operate at ever-increasing communication rates. Communication rates of 10 Mbps (megabits per second) were once considered to be a fast Ethernet network. When the application that became the '630 patent was filed in 1999, Ethernet networks that were 100 times as fast, i.e., 1 Gbps (gigabit per second), were available. Today, Ethernet networks may operate at 10 Gbps (or faster), due in part to the invention of the '630 patent. Going forward, there is no doubt that there will continue to be a need for Ethernet networks of ever-increasing communication rates.

17. Ethernet networks are used for local area networks, which are networks that cover a small geographic area, like a home, office, or group of buildings. Ethernet technology now underlies most local area networks, and Ethernet ports have long been a standard part of any new laptop or desktop computer.

18. Ethernet networks are a type of packet-switched network. A packet-switched network is one where a stream of data representing a communication is broken up into discrete pieces, called packets, and each packet is sent across the network individually. Because each packet travels across the network individually, certain packets may travel across a different path in the network than other packets. When the packets reach their destination, they are assembled to once again form a stream of data representing the original communication. The best known example of a packet-switched network is the Internet.

19. The invention of the '630 patent allows for increased transmission rates of Ethernet networks by, in one embodiment, dividing a data stream into individual bytes, and sending the bytes across multiple "logical channels" in a round-robin fashion (i.e., sending the first byte on the first channel, sending the second byte on the second channel, etc.). The data stream consists of packets and the packets' accompanying control information, which is necessary for properly transmitting the packets. If one sent the bytes of the data stream across, for example, four logical channels, one would be transmitting data at approximately four times the rate as if one had been sending the bytes across one logical channel. For example, if each logical channel operates at a rate of approximately 2.5 Gbps, the combined transfer rate of four such logical channels would be approximately 10 Gbps.

20. Some embodiments of the invention operates below the MAC (Medium Access Control) Layer of the Ethernet standard. The MAC layer is one of many layers in a generally accepted stack of such layers that are used to abstractly describe network protocols and network technology. When a computer application wishes to transfer a communication across a network, the communication can be thought of as being passed down from layer to layer on the computer, until it reaches the network. Each layer represents a certain set of functionality, and each layer provides services to the layer above it, and receives services from the layer below it. After being transmitted across the network and received at the destination computer, the communication can be thought of as traveling up through the same layer of networks (in reverse order), until it reaches the correct application on the destination computer. The MAC layer is near the bottom of this abstract stack of layers. After communications are passed down from the MAC layer, they

are logically close to being transmitted across the network. In the '630 patent, the division of a data stream into bytes and the later combining of bytes into a data stream both take place below the MAC layer.

21. The method described in the '630 patent involves both the transmission and reception of a high-speed data stream. In transmission, the high-speed stream (consisting of both data and control information) is divided into multiple lower-speed streams. These lower speed streams are appropriately formatted and transmitted over lower speed logical channels. For reception, the reverse operation is invoked, essentially combining the lower speed logical channels into the higher speed format. In some embodiments of the invention, the separate logical channels are connected to distinct physical communications links, such as electrical or fiber-optic connections. In other embodiments of the invention, the separate logical channels are combined into to a single physical communication link.

A. Ordinary Skill In The Art

22. One of ordinary skill in the art of the invention of the '630 patent would generally have at least a bachelors degree in electrical engineering, computer science, or related field, together with 3-5 years work experience as a development engineer on computer networking products.

B. Disputed Claim Terms

23. It is my understanding that the parties involved in this case have reached agreement on the meaning of some terms within the patent's claims, but that there are two terms which are presently disputed before the Court. These two terms are "portion [of a] communication," and "element of a communication" (and variations of that term). These terms appear in multiple claims.

24. It is my opinion that the meanings of these terms are clear from their ordinary English usage, and they are not in need of further definition for the purposes of properly interpreting the '630 patent's claims. I have reviewed the Declaration of Professor Anthony Acampora Regarding Claim Construction for U.S. Patent No. 6,873,630, in which he asserts that these terms are in need of further definition (which he also provides). I disagree with his

proposed definitions. In the following sections I provide the reasons for my opinions in this regard.

1. "portion [of a] communication"

25. The first disputed term, "portion [of a] communication," contains no technical terms or terms of art. Specifically, "communication" has a simple, ordinary English meaning, and it is used consistently in the computer industry in the same fashion as it is used in ordinary English. This ordinary meaning is sufficient for the proper interpretation of the '630 patent claims. Similarly, "portion" is a well understood term in ordinary English, and its usage in the '630 patent is consistent with this ordinary usage. Thus I disagree with Professor Acampora's assertion that these terms are in need of further definition.

26. Professor Acampora proposes that "portion [of a] communication" be defined as "the fraction or portion of a frame carried by one channel." He does not provide any explanation for his use of both "fraction" and "portion" in this definition, nor does he indicate whether he intends these two words to be synonymous or not. But in any event, it is clear that he has taken the word "communication" to mean "a frame carried by one channel." This suggested limitation of the word "communication" to be a single frame is inappropriate in my opinion, and in fact the patent specification makes it clear that even in the embodiments, the term "communication" is not limited to a single frame. In fact, the patent specification shows that the inventors intended the term "communication" to include a data stream consisting of *multiple* frames and other data.

27. For example, the patent states: "Thus, in this embodiment the individual bytes of each frame, or packet, of the communication are separated and sent across one of the channels in a round-robin fashion." (2:39-41.) By using the phrase "each frame … of the communication" it is clear that the communication can incorporate multiple frames.

28. In addition, the patent uses the phrase "data stream" when speaking of the "communication." For example: "The presently described embodiment achieves a high data communication rate (e.g., 10 Gbps) by dividing, or striping, *a data stream* directed from one network entity to another network entity into multiple logical channels." (4:12-15) (emphasis added.) As another example: "When receiving a communication … distributor/collector 100

collects data from the multiple channels to re-assemble a single *data stream*." (4:61-63.) Thus, the communication being divided among multiple logical channels is a data stream.

29. Further, not only does the data stream contain multiple frames, but it also contains control information necessary for the correct transmission of those frames. This control information can be seen in Figure 4 of the '630 patent:

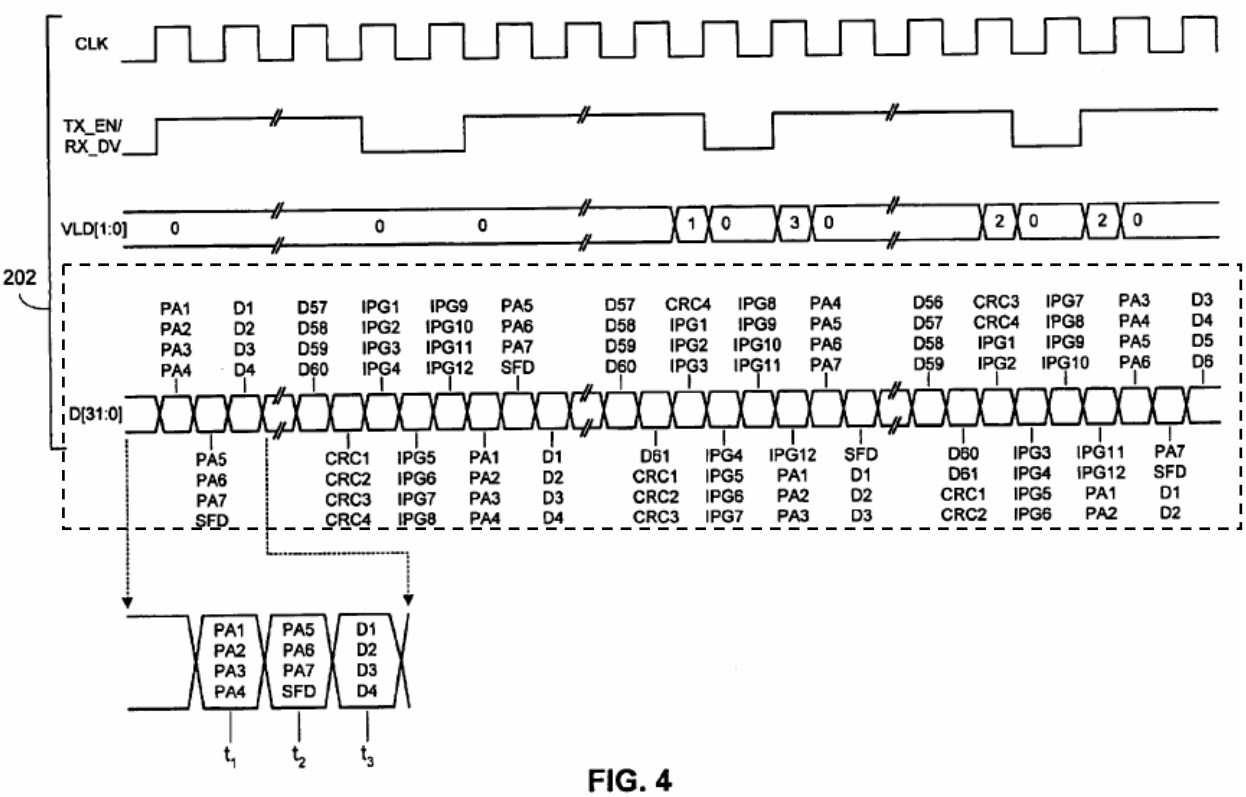

FIG. 4

('630 patent, Fig. 4.) This figure has been modified with a dashed rectangle showing a section of a data stream. The data stream is being passed from the MAC layer to the distributor module. (*Id*. at 13:17-20.) In Figure 4, time increases from left to right, so that the left part of the data stream is transmitted to the distributor module before the right part of the data stream. The figure shows that the data stream is comprised of packets and *additional control information* such as preamble information, start of frame delimiters, and idle information.

30. Each one of the labels on this data stream (e.g., "PA1," "PA2," "D1, "D2," etc.) corresponds to one byte. The first labeled bytes of the data stream ("PA1," "PA2," … "PA7") represent eight preamble bytes. (*Id*. at 13:3-7, 39-46.) The next byte ("SFD") is a start of frame

delimiter, which indicates that the beginning of a new frame (packet) is about to follow. (*Id*. at 13:5-7.) Next is a packet of 60 bytes ("D1" through "D60"), followed by four cyclic redundancy check bytes ("CRC1" to "CRC4"). (*Id*. at 12:42-45.) The 60 data bytes and the 4 CRC bytes represent one packet (of size 64 bytes). (*Id*.) The packet is followed by 12 idle bytes ("IPG1" to "IPG12"), and then the same sequence of bytes is repeated (i.e., preamble bytes, a start of frame delimiter, a packet, and idle bytes). ('630 patent, 13:41-43.) Because this data stream contains both packets and additional control information such as preamble bytes and idle bytes, it is incorrect to say that a portion of this communication must be limited to a portion of a frame. A portion of the communication also includes control information that is distinguishable from a frame.

31. Moreover, the agreed construction of "distributor" does not imply that "portion [of a] communication" must refer solely to a portion of a frame. The parties have agreed that a distributor is "a module that divides across multiple logical channels an Ethernet frame received from a MAC module." Professor Acampora attempts to use this agreed construction to support his proposed definition of "communication" as being limited to a single frame. However, as described above, such frames are part of a communication data stream that includes multiple such frames. There is nothing in this agreed construction for "distributor" that requires that the term "portion [of a] communication" means "portion of a [single] frame." Indeed, in the patent specification, the distributor divides the data stream, which may include multiple frames and additional control information. Hence, portions of the data stream (i.e., portions of the communication) will include multiple portions of multiple frames and portions of the control information.

32. This is confirmed by Figure 5A of the '630 patent, reproduced below with a dashed rectangle surrounding one portion of a communication produced by the distributor module:

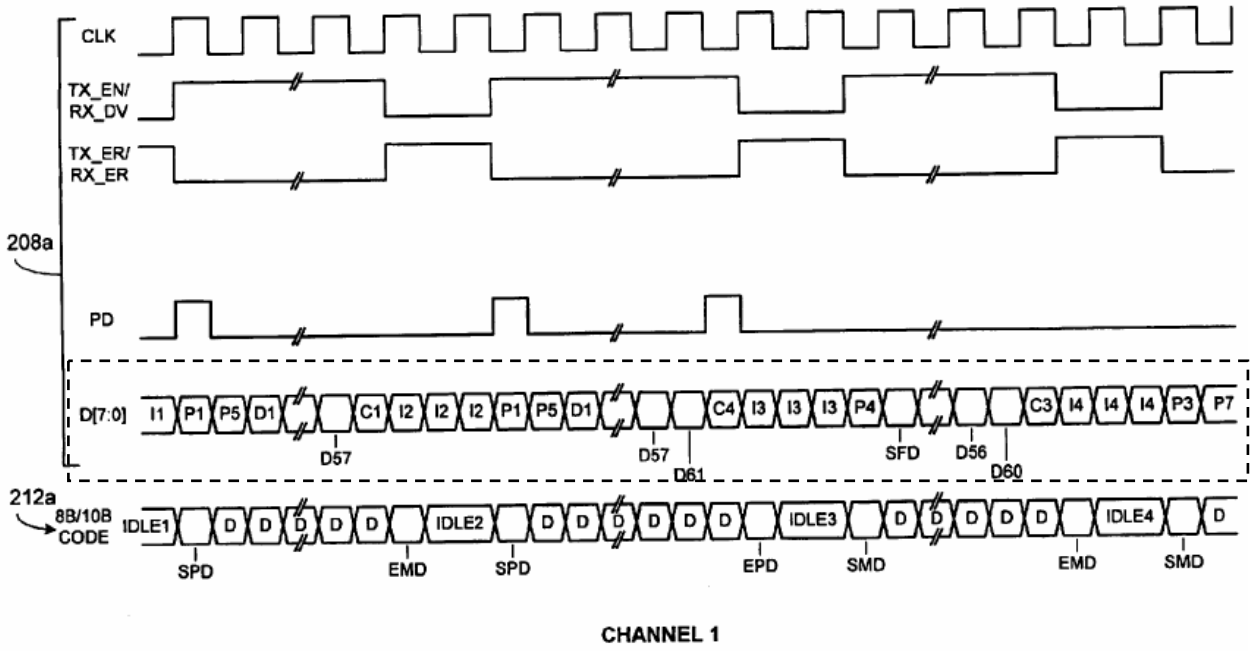

FIG. 5A

33. (’630 patent, 13:14-20.) The data inside the dashed rectangle shows the portion of the data stream from Figure 4 that is distributed to one of four logical channels. (*Id*.) Figures 5B-5D show the portions of the data stream from Figure 4 that are distributed across the other three of the four logical channels. (*Id*.) The portion of the data stream shown here is by no means limited to data from a single frame—it includes data from multiple frames, as well as data from the control information discussed above (preambles, idle codes, and start of frame delimiters). Specifically, this portion of the data stream includes data from three different packets. From left to right, the bytes “D1” to “D57” represent data from a first packet, the bytes “D1” to “D57” and “D61” represent a second packet, and the bytes “D56” and “D60” represent the end of a series of bytes from a third packet. The bytes labeled “P1,” “P5,” etc. represent preamble data, the bytes labeled “I2,” “I3,” etc. represent idle data, and the byte labeled “SFD” represents a start of frame delimiter. Thus, a portion of a data stream from the distributor includes portions of multiple frames as well as portions of additional control information.

34. The claims of the ’630 patent also confirm that a portion of a communication is not limited to a portion of a frame, but includes additional control information. For example, claim 17 recites, “wherein said first portion of a communication comprises: a first start signal

configured to indicate a beginning of said communication." In the specification of the '630 patent, and to one of ordinary skill in the art, such a start signal is understood to be control information rather than part of a data frame. ('630 patent, 12:42-46; 13:3-7.) Thus, the claims of the '630 patent explicitly recite a portion of a communication that, at a minimum, includes data in addition to a portion of a data frame. Even when a dependent claim limits the communication forwarded to "a process operating on [a] second network entity" (i.e., a computer program) to a single frame (as does claim 16, on which claim 17 depends), each *portion* of a communication nonetheless includes control information in addition to a portion of the data frame itself. (*Id*. at 16:52-53.) Therefore, at a minimum, the "portion of a communication" claimed by claim 17 is more than a "fraction or portion of a frame."

35. The claims of the '630 patent also confirm the understanding that a communication is simply a data stream. For example, claim 3 recites that a communication is received at a distribution module from a MAC module, which is consistent with the discussion above of the data stream that is received at a distribution module from a MAC module.

36. In summary, the plain language of '630 patent specification and claims shows that a communication is a data stream that may include multiple frames and control information.

2. "Element [of a] communication" (and similar phrases)

37. Professor Acampora asserts that "One of ordinary skill in the art at the time the '630 patent's application was filed in 1999 would have understood that the term 'element [of a] communication' (and related terms) in the claims of the '630 patent means 'a portion (e.g., a byte) of a 'mini-frame' that is individually encoded for transmission across one of a plurality of logical channels,' where a 'mini-frame' is 'a fraction or portion of a communication received from or sent to a media access control layer from a physical layer device and that is carried by one channel.'" I disagree with this assertion, for the reasons stated below.

38. Certain of the '630 patent's claims are focused on the transmission of a communication, whereas other claims are focused on the reception. The term "element" is used within the transmission claims in a different fashion from the way they are used in the reception claims. Professor Acampora's proposed universal definition of element does not fit the manner in

which the term is used in these claims. We can see the problems of Professor Acampora's proposed definition by examining representative claims. For example, claim 3 is a claim covering the transmission aspects of the invention. Professor Acampora's definition requires that an element is a portion of a mini-frame, where a mini-frame is "carried by one channel." Note that to be "carried by one channel," a mini-frame in Professor Acampora's definition must have already been distributed to a particular channel. But this is contrary to the language of this claim, in which the elements are first distributed into portions and subsequently the portions are sent to the channels. It is clear from the language of this claim that in contrast to Professor Acampora's definition, elements of a communication in this claim are simply understood as being part of the original communication, prior to the distribution of the communication to the various channels. The plain English language of "element of a communication" requires no further elaboration for this to be clear to one of ordinary skill in the art at the time the '630 patent application was filed.

39. In contrast, claim 15 is an example of a claim focused on reception. In this case, the patent language describes receiving the portions from the multiple channels, and then collecting elements from the portions prior to forwarding towards a process. Here, in contrast to the elements of claim 3, the elements are part of the portions at the time they are received over the multiple channels. But as was the case in claim 3, the plain English language of "element of a portion" requires no further elaboration for this to be clear to one of ordinary skill in the art at the time the '630 patent application was filed. The patent's use of explicit phrases like "elements of communication" and "elements of a portion" explains clearly what the elements are in the context of the individual claims, and any attempt at a further elaboration—like Professor Acampora's proposed universal definition—only would serve to confuse the claim's clear language.

40. Professor Acampora's proposed definition of "element" also requires that it be "individually encoded." I disagree that such a definition would be clear to one skilled in the art. First, there is no reason to incorporate any encoding aspect into a definition of element. Second, the phrase "individually encoded" has more than one possible meaning, and Professor Acampora has not assigned a precise meaning to the phrase. Individual encoding could simply mean, for example, that in a stream of bytes, one byte is encoded before the next byte is encoded, and that

byte is encoded before the next byte is encoded, etc. But individual encoding could also mean, for example, that the encoding process encodes a byte without considering what byte appeared before it. In other words, the code-group to which a byte will be mapped is not dependent on what code-group the byte before it was mapped.

41. Under either definition, there is no justification in the specification for such an "individually encoded" limitation. Indeed, many common encoding techniques in the industry operate on *streams of data* rather than on individual bytes in a byte-by-byte fashion. There is nothing in the patent text that would preclude the use of such encoding techniques. In fact, the specification explicitly refers to the 8B/10B encoding used in the Gigabit Ethernet standard (10:12-16), in which one of two possible encodings of each byte is selected depending on the pattern of the prior data stream. Hence, 8B/10B encoding is not "individually encoded." For these reasons, I disagree that "elements" must be "individually encoded."

I declare under the penalty of perjury under the laws of the United States of America that the foregoing is true and correct. This declaration is executed on this July 20, 2008, in Venice, California.

MR. GREGORY ENNIS